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EXAMINER	
CALANDRA, ANTHONY J	
ART UNIT	PAPER NUMBER
1791	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/595,860	SNEKKENES ET AL.	
	Examiner	Art Unit	
	ANTHONY J. CALANDRA	1791	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 May 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Detailed Office Action

1. The communication dated 5/17/2006 has been entered and fully considered.

2. Claims 1-8 are currently pending.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1-8 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 1 applicant states that the reactor system has "several oxygen reactors". The term 'several' is an indefinite but small number (it can mean greater than two or greater than 3). Examiner cannot from the definition determine how many reactors the system of the applicant requires. For the purpose of examination the examiner has determined the term 'several' to be more than 2 reactors but less than 6 reactors.

Claims 2-7 are dependent on instant claim 1.

Claim Interpretation

4. In claim 1 Examiner has taken the broadest meaning of 'several' to mean more than 2 but not many. The term 'several' can also mean more than 3 but not many; however the applicant would need to claim that as a limitation.

5. In claim 1 examiner has interpreted 'reactor' from the drawing 1 as a vessel larger then the smaller sized piping that the pulp also flows through Examiner has made this determination

such that normal pipe that connects individual reactors is not considered a 'reactor'. If this distinction isn't made then the examiner may consider piping between reactors/mixing units as individual reactors because a reactions still occurs inside of them.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 1-5, 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Selectivity Optimization of Extended Alkali Oxygen delignification* by VAN HEININGEN et al., hereinafter VAN HEININGEN in view of Chemical Pulping by GULLICHSEN, hereinafter GULLICHSEN and in further view, of WO 97/17489 NORBORG et al., hereinafter NORBORG, or in the alternate, GULLICHSEN in view of VAN HEININGEN and in further view of NORBORG.

As for claim 1,

- Storing pulp in a pulp chute
    - VAN HEININGEN teaches a method for oxygen delignifiying pulp using three stages. VAN HEINIGEN is a laboratory experiment and does not teach the components used in oxygen delignification in an industrial setting. GULLICHSEN discloses basic industrial techniques for oxygen delignification. GULLICHSEN discloses that pulp is pumped from a pulp chute prior to oxygen delignification [pg. A636 Figure 39]. At the time of the invention it would have been obvious to a person of ordinary skill in the art to apply the industrial side application of GULLICHSEN to the laboratory experiments of VAN HEININGEN. A person of ordinary skill in the art would be motivated to use technology and equipment that is known to work in an industrial setting. Further, it is *prima facie* obvious apply known techniques to similar methods in the same way. In the instant case known oxygen delignification industrial technology of GULLICHSEN is applied to the oxygen delignification experimental method of VAN HEININGEN.

- Alternatively, at the time of the invention it would have been *prima facie* obvious to add a third delignification stage to the oxygen delignification of GULLICHSEN as taught by VAN HEININGEN. A person of ordinary skill in the art would be motivated to do so such that a higher delignification would be achieved as taught by VAN HEININGEN [pg. 4 column 1].

- At medium consistency of the pulp in a range of 8-18% (VAN HEININGEN discloses 10% consistency [pg. 1 column 1 Methods and Materials]. GULLICHSEN further teaches the advantages of medium consistency [pg. A636]).
- The pulp to be delignified has a kappa value of at least 15 units (VAN HEININGEN discloses pulp with a starting Kappa number of 26. 7 [pg. 1 Table 1]).
- The oxygen delignification takes place in a reactor system with several oxygen reactors with predetermined retention times (VAN HEININGEN discloses 3 reactors with defined retention times. *Examiner has taken the broadest meaning of 'several' to mean more than 2 but not many. Several can also mean more than 3 but not many, however the applicant would need to claim that as a limitation* [pg. 4 Figure 7]).
- Adding alkali to the pulp in order to obtain an initial pH exceeding 9.0 and adding oxygen in an amount of 5-50 kg per tonne of pulp (VAN HEININGEN discloses adding alkali to each reactor [pg. 4 Figure 7 and pg. 1 Figure 1]. VAN HEININGEN does not explicitly disclose the pH of the oxygen delignification but it is clear from the addition of caustic that the pH is alkaline. Oxygen delignification is an alkaline process and would show a pH over 9 as evidenced by NORBORG [pg. 4 line 5]. GULLICHSEN

discloses that between 20-24 kg/t of oxygen is used during oxygen delignification which falls within the instant claimed ranges [pg. A141 table 12].

- Providing a predetermined retention time of greater than 45 minutes (VAN HEININGEN discloses 90 minutes of retention time [pg. 4 Figure 7].
- In association with an initial mixing-in operation, placing the cellulose pulp under a pressure of greater than 15.0 bar. Subjecting the pulp to more than one remixing position where a final pressure after final remixing is at least 13 bar.
    - VAN HEININGEN teaches a pressure of 100 psig (6.7 bar) during each delignification stage. GULLICHSEN discloses a much higher pressure of 7-10 bar in an industrial setting at the ***top of the reactor*** [pg. A636 Table 1]. The pressure located near the pump must additionally include piping losses, valve losses, equipment losses, and static head. Examiner has taken a person of ordinary skill in the art to be a chemical engineer capable of sizing/designing an oxygen delignification line. As tonnage increases the height of reactors necessarily will be required to increase to maintain a constant L/D value. As height increases of the final reactor the pressure at the bottom of the reactor at the first pump must increase. For the purpose of arguments a 100 ft first reactor would yield an additional 3 bar of static pressure head required at the first pump (100 ft / [2.31 ft/psi] *bar/14.69 psi). This additional pressure does not even include the frictional pressure losses from piping, piping elbows, chemical mixers, valves, and flow distributors that the pump must overcome. As tonnage increases the height of the reactor must additional increase (same retention time,

L/D value). It is obvious to a person of ordinary skill in the art to increase tonnage, further it is necessary that the height of the oxygen delignification tower must increase in height and therefore it is obvious that a system with a 10 bar pressure at the top of the reactor could have a pressure of greater than the 15 bar at the bottom of the reactor.

- Alternatively, NORBORG discloses that pressures of 15-20 bars of pressure improve the oxygen delignification of pulp [pg. 2 lines 24-25]. At the time of the invention it would have been *prima facie* obvious to have a high pressure of greater than 15 bars as disclosed by NORBORG in the process of GULLICHSEN/VAN HEININGEN. A person of ordinary skill in the art would be motivated to have high pressures as to increase pressures to this pressure such that there is an increase in oxygen delignification selectivity [pg. 2 lines 10-24]. The pressure at the first reactor would therefore be 15 bar as taught by NORBORG which is greater than 13 bar, the pressure at the pump must be greater than 15 bar to overcome frictional losses. A person of ordinary skill in the art would expect the pressure to decrease as the pulp traveled through successive reactors due to frictional loss. Further GULLICHSEN discloses that the final long reaction stage should take place at lower pressures [pg. A636-A637].

- Where the number of high pressure reactors is X, the retention time ranges from t1-tx for each reactor R1-Rx such that t1<t2<tx
  - VAN HEININGEN discloses three stages each with successfully higher retention times of 20 minutes, then 30 minutes and finally 40 minutes [pg. 4 figure 7].

As for claim 2, VAN HEININGEN discloses three stages each with successfully higher retention times of 20 minutes, then 30 minutes and finally 40 minutes [pg. 4 figure 7]. The times for the initial two reactors are higher than that of the instant claims which states that Tmax for the first reactor is 10 minutes. GULLICHSEN discloses that the first portion of oxygen delignification takes place relatively quickly [pg. A636-A637]. GULLICHSEN therefore discloses that reaction time is a result effective variable [pg. A635 2.1.1]. At the time of the invention it would have been *prima facie* obvious to optimize the time of the first two high pressure delignification reactions of VAN HEININGEN to lower reaction times.

As for claim 3, GULLICHSEN discloses that oxygen is added subsequent to the to the MC pump in both Alhstrom (now Andritz) and Kvaerner (now Metso) oxygen delignification systems [see e.g. pg. A630 Figure 30, pg. 639 and pg. A640 Figure 45]. The MC pump is what establishes the high pressure of the system.

As for claim 4, GULLICHSEN discloses that the slow acting stage, long residence time stage should be hotter than the fast acting delignification stage. GULLICHSEN discloses temperatures of over greater than 5 degrees C [pg. A636-A637]). A person of ordinary skill in the art would expect the pressure to decrease as the pulp traveled through successive reactors due to frictional loss. Further GULLICHSEN discloses that the final long reaction stage should take place at lower pressures [pg. A636-A637]. Therefore at the time of the invention it would have been obvious to a person of ordinary skill in the art to optimize the pressure and temperature of the final stage of VAN HEININGEN according to the teachings of GULLICHSEN.

As for claim 5, VAN HEININGEN discloses adding caustic before each oxygen delignification stage [pg. 4 column 1 paragraph 1]. This requires remixing. GULLICHSEN

shows that for two-reactor systems remixing is completed with MC mixers between stages [Figure 45]. GULLICHSEN discloses that an MC mixer has between 0 and 4 meters of pressure drop which is less than 1 bar [see e.g. pg. A627].

As for claim 7, VAN HEININGEN discloses splitting the caustic between each of the three stages [pg. 4 Figure 7]. VAN HEININGEN discloses adding equal amounts of alkali to each stage during a three stage process [pg. 4 figure 7]. However, VAN HEININGEN additionally discloses that high initial alkali charges extend delignification and increased selectivity [pg. 1 column 1]. Therefore a person of ordinary skill in the art would be motivated to optimize the various alkali charges across the three stages to have a high initial alkali charge to extend delignification and increase selectivity.

As for claim 8, GULLICHSEN discloses the use of wash presses prior to oxygen delignification [pg. A636 Figure 39]. A wash press squeezes pulp to a high consistency. The pulp exits the wash press and is diluted in a conveyor screw prior to dropping in an MC pump shoot which then pumps the pulp into the oxygen delignification. GULLICHSEN discloses that after oxygen delignification the pulp is subject to post oxygen delignification washing. Filtrate from the washer is sent back to the brownstock washers counter-currently; therefore the filtrate from the post-ox washer is used to dilute pulp in the pre-ox washer. The filtrate that is removed during washing is liquor that is displaced from the pulp which has past through the oxygen delignification system, therefore the liquor is oxidized. Examiner takes official notice that oxidized liquor is a common and well known source of caustic (NaOH) liquor used in oxygen delignification plants in the pulping industry.

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Selectivity Optimization of Extended Alkali Oxygen delignification* by VAN HEININGEN et al., hereinafter VAN HEININGEN in view of Chemical Pulping by GULLICHSEN, hereinafter GULLICHSEN and in further view, if necessary, of WO 97/17489 NORBORG et al., hereinafter NORBORG, or in the alternate, GULLICHSEN in view of VAN HEININGEN and in further view of NORBORG, as applied to claim 1 above, and further in view of U.S. Patent 6,162,324 MILLER, hereinafter MILLER.

As for claim 6, VAN HEININGEN does not disclose a mixer inside a reactor. GULLICHSEN discloses a mixer inside the reactor volume during oxygen delignification yet this is for high consistency pulp [pg. 142 Figure 131]. MILLER discloses the use of a high shear mixer inside the reactor volume [Figure 4 and column 4 lines 49-59]. At the time of the invention it would have been prima facie obvious to use a high shear mixer as described by MILLER in a high pressure reactor of VAN HEININGEN/GULLICHSEN/NORBORG. A person of ordinary skill in the art would be motivated to do so to enhance the performance of an oxygen delignification system as suggested by MILLER [column 4 lines 49-59].

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANTHONY J. CALANDRA whose telephone number is (571)

270-5124. The examiner can normally be reached on Monday through Thursday, 7:30 AM-5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Griffin can be reached on (571) 272-1189. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Anthony J Calandra/

Examiner, Art Unit 1791

/Steven P. Griffin/

Supervisory Patent Examiner, Art Unit 1791